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Dull Finishing

of Rayon Knitted Fabric

By F. P. W. WILSOME

IN SPITE of the present-day large production of low luster rayon yarns, that is, yarns spun in a dull state by the rayon manufacturers, quite a large amount of delustering of bright rayon materials is carried out by dyers and finishers. Generally speaking, delustering as effected by the finisher is less satisfactory than that of the rayon manufacturer since it is less permanent. After two or three washes the delustered goods lose the substances incorporated in them to reduce their luster and so they again acquire undesirable brightness. But delustering by the finisher is a cheap process and it is this particular advantage which commends itself to manufacturers of rayon goods.

Knitted rayon goods are very absorbent as compared with woven materials and they therefore lend themselves excellently to impregnation with a suspension of a white water-insoluble pigment such as can produce dulling. But there is one difficulty. Knitted fabrics stretch easily in all directions and thus it is not easy to pad them in a two-bowl mangle with the dulling liquor as is the case with the less stretchable woven fabrics. For this reason hitherto a large amount of dulling has been carried out by treating the knitted fabrics in rope form with a dulling liquor in a winch machine in much the same manner as for dyeing.

Dulling in the winch machine is not altogether satisfactory. Firstly, although good results can be obtained, the process occupies a considerable amount of time. It is seldom possible to dull 100 pounds of knitted fabric in less than two hours. Also, after the dulling process is complete, the goods must be removed from the winch machine and then hydro-extracted. In taking out the fabrics from the winch machine and while they await an opportunity for hydro-extraction, drainage occurs and frequently the dulling liquor runs so as to cause streaks of extra-dulled places. Furthermore, in order to secure uniform dulling the pigment used must be very finely divided so that it has but little tendency to settle in the dulling liquor. Because of these disadvantages attention has been turned to the development of padding machines which will impregnate the fabric uniformly and at the same time enable subsequent hydro-extraction to be avoided. Such a machine is now available and its essential characteristics are shown in Fig. 1.

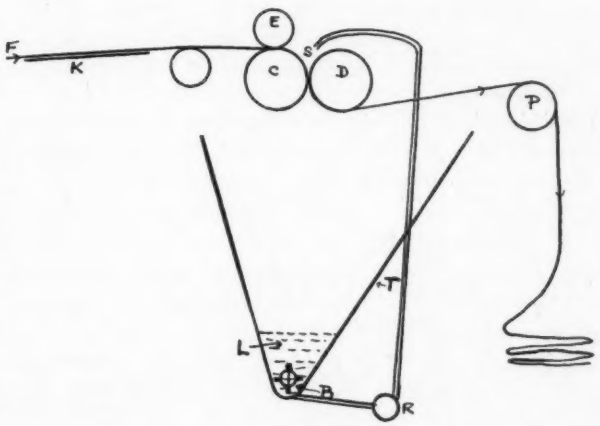

Fig. 1

The machine (Bates Finishing Machine Co., Leicester, England) consists of a V-shaped stainless steel trough T containing a comparatively small amount of dulling liquor L which is constantly stirred or agitated to maintain its uniformity by rotating beater B. The dulling liquor L is continuously withdrawn from T by means of the small rotary pump R and sprayed uniformly along the whole length of the V-shaped space S between the two horizontally opposed rubber covered rollers C and D. E is a small roller which presses lightly on roller C and is merely a guiding roller. C and D are the main impregnating rollers. The dulling liquor overflows at the ends of rollers C and D and falls back into the trough T for recirculation.

In the process of dulling, fabric F in tubular form passes forward over a stretcher K so that it goes between rollers

E and C and thence downwards between rollers C and D to be afterwards drawn away by the plaiting device P. As the fabric passes between C and D it passes through the dulling liquor and is thereby saturated with this. On emerging from rollers C and D the fabric is uniformly impregnated with the dulling liquor and is sufficiently dry that it needs no hydro-extraction before being dried in the usual manner by hanging in a hot stove or by passage over a tubular drier.

The degree of dulling can be accurately determined by modifying the strength of the dulling liquor and also by regulating the amount of pressure between horizontally opposed rollers C and D.

It will be noticed that with knitted fabric it is essential that this should be in tubular form. Hence if the fabric is of the warp loom type its selvedges should first be sewn together. This operation is, of course, also necessary for the dyeing process which usually precedes dulling.

As a dulling liquor it is suitable to use any white pigment suspension such as China clay or a proprietary dulling agent. A softener should be added so that the handle of the fabric is not adversely affected. An addition of a small amount of a deliquescent substance is also recommended such as glycerine or magnesium sulfate. Experience has shown that a machine of the type described above gives excellent results.

● CIBA RELEASES

The Society of Chemical Industry in Basle, represented by the Ciba Co., Inc., has lately issued the following circulars and sample cards.

Cibacete Scarlet B R powd. pat.—a new straight dyestuff for acetate fibers which not only is claimed to have better penetration than the former type, *Cibacete Scarlet G*, but also to give a greater fastness to light on acetate which has been delustered in the course of manufacture. The new type dyes somewhat clearer and bluer than the older one. The dyeings are said to be very fast to light and to have good fastness to washing, water, perspiration and acids. It is stated that cotton and viscose are only slightly tinted which tint may easily be removed with soap or hydrosulfite B Z. The same is said to be true in the case of wool or silk in mixed fabrics. This dyestuff is further said to be easily dischargeable to pure white on acetate. Circular No. 435.

Cloth Fast Brilliant Blue G pat.—a new straight acid alizarine dyestuff said to be of first consideration for the dyeing of loose wool and slubbing; of interest for goods requiring a light fulling and for knit goods. It is stated that it is chrome resistant and in consequence of its excellent properties may be used for shading chrome colors. It is further stated that this dyestuff is of considerable interest in the dyeing of silk, both in skein and silk, using it in either neutral, weakly acid or a soap bath. Good fastness to washing and light, and very good fastness to water, stoving, perspiration, decatizing, acids and alkalies is claimed. Circular No. 440.

Rosenthrene and Diazo Colors on Viscose—a sample card showing 120 dyeings in two shades on viscose thread. The dyestuffs are classified in light fast and in less fast products as well as according to fastness and dischargeability. Sample card No. 1208.

Cibanone Blue B 2 G—a new vat dye for the production of sky blue shades said to be of good fastness to light and washing, and to be particularly adapted for upholstery goods such as curtains, drapes, furniture, yarns, etc. It is claimed that dyeings of equal fastness to light and purity of shade cannot be obtained with substantive colors. It is stated that in consequence of its good levelling properties, it is particularly adapted for the dyeing of piece goods and rayon yarns. In combination with *Cibanone Yellow G C* it is said to give pure green tones of very good light fastness. Sample card No. 1238.

Navy Blue on Wool Pieces—a sample card showing a selection of navy blue types on wool piece goods. It is stated that the Neolan Navy Blue types are the best choice for men's and the better grades of women's wear, since they give a good fastness to light, washing and perspiration. The same is said to be true for the new Wool Fast Navy Blues, which are dyed with formic acid and require sulfuric acid only for exhaust and final boil. Besides the above mentioned colors there are also the Chrome Fast Colors, the Cloth Fast Colors and the ordinary acid dyestuffs. Sample card No. 1241.

Chlorantine Fast Blue Types—a sample card showing 8 members of this series on a variety of materials. These dyestuffs are said to furnish dyeings of good to very good fastness to light and to be suitable for dyeing the best qualities of drapery and upholstery fabrics. A uniform one tone dyeing on mixed fabrics of cotton and viscose is said to be possible. It is stated that acetate will be perfectly reserved in fabrics containing this fiber and that the dyeings are all dischargeable to a pure white. Sample card No. 1242.

● SOUND PICTURES

Republic Steel Corporation, maker of alloy and stainless steels, announces early release of the first sound picture on the manufacture, fabrication and application of stainless steel. The picture, "Enduro, Republic's Perfected Stainless Steel," is said to be one of the finest examples of industrial motion picture photography ever produced.

The picture makes use of off-screen narration to describe in non-technical language the scenes which tell the story of the making of stainless steel and its fabrication into the most intricate forms, as well as those scenes which picture many of its applications. Beginning with the mining of its principal component parts, such as chromium in Rhodesia and nickel in Canada, the film traces the various steps in the manufacture of stainless steel. Particularly spectacular are several of the shots showing the handling and pouring of hot metal from the giant electric furnaces in which the steel is made.

Crease-Resisting Fabrics—III

(Concluded from November 4th issue)

By CHESTER AMICK*

QUALITIES OF CREASE-RESISTING FABRICS

THE editor of the *New York Times* in an editorial published early in the fall of 1932 hailed the invention of crease-resisting fabrics as one of the outstanding achievements of recent years. Viewed from the yardage sold during the past two and a half years one wonders if he were over enthusiastic.

Several factors have combined to hold down the yardage finished by this process. First of all, there was *and is* the depression. The textile business has suffered severely during the past four years and the future is not particularly bright, as viewed at this time. However, textiles are a necessity according to our present standard of living and unless we give up the fight and proceed to import all of our cotton and rayon fabrics, the necessity will eventually cause the industry to improve. When this happens, the public will demand not the *cheapest* fabric, but the one which gives them the most *convenient* service. To substantiate this statement, one has only to look at the oil burner, the electric refrigerator, the automobile, and last of all, air-conditioning. The response to this demand on the part of the public will be crease-resisting fabrics. The writer does not mean to imply that they will be made according to the formula laid down by Foulds and his co-workers, because invention is not idle. But at the moment, the process outlined by Foulds is the best that we know.

Another factor which has operated against expanded yardage of this finish is one which the manufacturers themselves have committed. It has not been advertised. The public today has not been informed that a fabric which is much less liable to creasing or crumpling can be obtained. True, manufacturers have been sorely pressed during the recent years to keep from closing the doors of their plants and could ill afford to spend money for advertising, and they deserve credit for the stubborn resistance which they have made against heavy odds. Nevertheless the inability to do what should have been done does not change the economic law that "if business does not come to you, you must go to business." As yet, this has not been done with crease-resisting fabrics and when this is done, the writer predicts a bright future for the finish as well as for the manufacturer who promotes it.

The third factor which has operated against the speedy acceptance of this finish is the finish itself. Unfortunately, *all* fabrics will not accept it satisfactorily, and in this respect it has many companions, such as blue-bender cotton which cannot be used for everything. The important thing is that some fabrics *do* accept this finish and are improved by it. It is then possible to line up the misfits and increase the demand.

Generally speaking, the cheaper the fabric, the poorer the quality of cotton contained therein, the less such a fabric responds to this finish. Construction is also a factor here. Fabrics containing combed yarns having a high cotton density are superior to fabrics made from carded yarns, although this does not mean that the latter class of fabrics should be completely ruled out. Carded piques have never responded satisfactorily to this finish, and since this fabric is widely used, it has been a real disappointment. On the other hand, cotton voiles, particularly 60s and 70s respond readily to the finish and have provided the greatest yardage to date. Usually 70s voiles are made from combed yarns, while 60s voiles may be made from carded yarns. Many fabrics by careful handling during the finishing operation can be classed among those which accept the finish satisfactorily whereas attempts to cut short the process results in an inferior finish on these same fabrics. It is fortunate that the finishing plants which have been engaged in producing this finish have shown the good judgment to move slowly. By so doing, they have sold the idea that the finish on some fabrics is satisfactory, whereas wholesale finishing of all fabrics would have thrown the process into disrepute.

The following fabrics have shown more than average promise when finished by the crease-resisting process. It is realized that the kind of yarns and their construction would be of material benefit in this description, but unfortunately this information is not available. The fabrics follow:

Plain Cloth (Cotton)

Grey width	*Construction*	*Yds./lb.*	*Finished width*
38	88x116	5.7	35/36.
38	96x60	4.4	36/37.
38	96x72	4.8	36.
38	120x72	3.8	36.
38	144x64	4.5	36.
38	96x56	4.3	35/36.
41	48x48	4.95	38.

All except the first and last of this group have also been used in the manufacturing of neck-ties and have proved quite successful. With appropriate designing, there is no reason why they should not find a real place in beach costumes, and some of them should find a place in the shirting trade.

*Calco Chemical Company, Bound Brook, N. J. Formerly Finisher of Crease-Resisting Fabrics, Glenlyon Print Works.

Lightweight Cotton Fabrics

40	96x104	6.9	38/39
Batiste	76x72		
Lawns	88x80		
Combed percale	88x80	6.4	35/36

In addition to these fabrics, dimities, 50s, 60s, 70s, 90s and 100s/2 voiles accept the treatment beautifully and should prove to be a source of profit for the progressive finisher.

Cotton Crepes

39	76x68	5.4	35/36
39	80x80	3.6	35/36
38	76x64	3.8	34

These constructions have given excellent results when the finish was properly applied. However it is remarkable to what an extent the prior treatment affects the success of the crease-resisting finish. It has been necessary to mercerize some of these constructions to get a satisfactory finish, while on others it is not necessary. Generally speaking, mercerizing prior to the application of the resin is beneficial.

Cotton Suitings

37½	64x72	4.7	35
37½	32x32	2.85	35
37	44x40	3.0	35
37	70x68	3.0	35
36	92x64	4.4	35
37	30x30	3.3	35
37	96x52	3.0	35

An all-rayon suiting 40 88x38 2.2 39 accepted the finish beautifully. It did not seem possible in comparing the treated fabric with the untreated one that the application of synthetic resins could have produced such beneficial results.

Twills (Cotton)

40	68x88	5.2	39
39	68x76	4.0	36

These twills have been among the most successful fabrics which the writer has finished. Reports from the trade indicate that this fabric in the crease-resisting finish would have had a larger sale, had the price situation been right. When this condition is adjusted, there is no reason why the demand for twills in the crease-resisting finish should not continue.

Mixed Fabrics. Rayon Filled Crepes

38	76x76	5.3	35
39	84x60	6.1	36
38	52x60	4.8	35/36
38	88x76	...	35/36
40	72x64	5.8	35/36
38	76x60	6.1	35½

Unfortunately, acetate continues to play its peculiar role as a textile material and refuses to accept the crease-resisting finish. When acetate is used as an effect yarn with cotton or rayon, the fabric can be handled successfully, but not when acetate forms the entire warp or filling. Application of the resin to the acetate (all acetate voiles for example) causes crease marks to show white which of course rules it out.

All-Rayon Fabrics

With one exception, all rayon crepes have not been too successful. However, this exception proved to be the second largest number in the writer's experience. Certain all rayon serges for the neck-tie trade, some taffetas, particularly a 39 68x60 8.2 38, some flat crepes and the rayon marquisettes mentioned previously show unusual merit. Spun rayon is perhaps the best of all fabrics in this respect, but the use of spun rayon is not yet important in the American market. It is difficult to believe, however, that the beneficial qualities added to such a fabric by the crease-resisting process will remain unused when this fabric comes into its own. People who want to find a real competitor for wool should try a resin finish on spun rayon.

The troubles which all-rayon taffetas present are typical of all tightly woven fabrics. They cannot be made Anti-Crease but they can be made crease-resisting. Even an all-silk (real) fabric creases and it is a large order to expect to get a superior finish on an inferior product. In this connection, the writer wishes to add that in his opinion it was a mistake to call the finish an *Anti-Crease finish*. This is a negative suggestion and is wrong psychologically. Usually when an individual is given a piece of finished goods and asked for his opinion, he is quite optimistic. When he is told that it is an "anti-crease" finish, however, his response is to wring it in his two hands so tightly that he sometimes actually distorts the yarns, and of course it creases. Then he says that it is not "anti-crease" and he is right. But if he were told that it was crease-resisting, he would have to admit that. It is correct psychologically.

Mixtures of Cotton and Wool

Cotton and wool crepe: 38 64x72 5.5 36

This mixture has been a disappointment as it had been anticipated that such mixtures would prove a boon to the woolen people. The above fabric was rather good but it contained only one yarn which had a relatively small amount of wool. It is quite probable that cotton treated before the fabric was woven or before the mix was made into yarns would be an advantage but it is not known whether this has been tried.

The above list contains many possibilities for future development and undoubtedly the time is not far off when full advantage will be taken of this fact. It is difficult to predict at this time whether the development will come through the use of urea-formaldehyde resins or through some entirely different process which produces the result.

Of particular interest from the crease-resisting standpoint but not particularly important to cotton finishers is the application of synthetic resins to transparent velvets. This fabric which contains a rayon pile responds to the treatment in a remarkable manner although it is not a fabric that one would ordinarily think of as being suitable for the treatment. But the pile is made more elastic and as a result withstands pressure marks as well as being

more resistant to creasing. Furthermore the weight of the fabric is increased and those who have examined it from the consumer standpoint have been enthusiastic about it.

These are some unusual properties of fabrics which have been treated by the crease-resisting process. One of these is brittleness. This is indicated by a lowering of the tensile strength of the fabric. In only one cotton fabric that has come to the writer's attention has the strength been maintained during the process. Usually this reduction in strength is not large and for fabrics that break above 20 lbs. in a 1-inch strip can be ignored. This loss of strength is due, not to an actual weakening or deterioration of the yarns, but to a physical effect. By removing the synthetic resin, the original strength is again approached although it may not be reached. This is not unusual as it is recognized in finishing plants that the more goods are handled in process, the more they depreciate. On the other hand if the fabric has been overheated during the high temperature treatment or has been left at the proper temperature for too long a time, destruction of the fibers occurs which results in a loss of tensile strength. When this occurs, removal of the resin may actually give a still greater loss in strength because the extra processing of the damaged fibers weakens them still more.

Rayon fabrics usually retain all their strength and frequently become stronger, particularly if the breaking tests are made on pieces which have been moisture-conditioned at a relative humidity of 65%. This is undoubtedly due to the fact at least in part that the untreated material absorbs more moisture than the treated, although the penetration of the filament by the resin may also increase the slip resistance. A yarn composed of both cotton and rayon, or a 2-ply yarn having one ply rayon and the other cotton will maintain its strength practically 100% in spite of the extra processing that is necessary when the crease-resisting finish is applied.

Combed cotton yarns better maintain their strength during the process than carded yarns. It would seem from this that the hodge-podge arrangement of the fibers of carded yarns as contrasted to the more nearly parallel arrangement of the fibers in combed yarns contributed to this effect. From this one might reason with a good deal of accuracy that some of the resin is on the surface of the fiber and acts to prevent slippage of the yarn so that the breaking load can be distributed over the widest number of fibers. Any one who has made finger-break-tests on the treated fabrics will have noticed that the break is smooth, that it occurs with a snap, and that there is very little slippage.

This brittleness or apparent weakness has been one of the strong arguments against the process. But it is due to the physical action of the synthetic resin and can be duplicated by treating the fabric with glue or with other sizes of like nature. Nevertheless, many attempts have been made to eliminate this defect such as mercerizing the fabric after the resin has been converted to the insoluble state, special washing in soap and soda liquors, and applying a lubricant during the final finishing operations. Mercerization after treatment with the resin is efficacious but has the additional unfortunate property of reducing the crease-resisting value of the fabric. Furthermore it is expensive.

The fabric which shows the greatest loss in strength as a result of the crease-resisting finish is linen. In spite of the fact that linen and cotton are both forms of cellulose, the linen is very difficult to treat. However, it is possible to obtain a crease-resisting finish on a heavy linen fabric which will reduce the tendency to crease or crumple to less than that of a cotton fabric of the same weight which has *not* received the crease-resisting treatment. And this is a lot because linen in its naturally finished state is terrible. Tootals have accomplished a satisfactory result by starting with "green" linen and devising specially constructed fabrics to allow for the necessary shrinkage which occurs.

Another property which has been used as a criticism of the product is the heavy, sandy hand. These usually are spoken of together in criticizing this finish and will be done here. An equal number of equally capable textile men think that the heavier hand makes a real piece of cloth. Fabrics finished in the usual manner appear sleazy when compared with the treated piece. And the "sandy" hand is not so much that, as it is a "dry" hand. The two combined, give a cotton crepe, or twill a real "worsted" hand and one that is exceptionally pleasing. Who knows, the time may soon come when the difference in hand will be enough to create a demand for the finish.

Then there is the criticism offered because of the expense. This is real at the present time although it may not be a few months or years from now. The writer has visited the head of the piece-goods department in many retail stores and inquired about the consumer value of this finish. In practically every case the response has been that the cost is too great. In one instance it was stated that a summer line costing 19 cents a yard retailed for 29 cents. But the same fabric in a crease-resisting finish cost 9 cents a yard more, 28 cents total, and could not be retailed for 39 cents a yard as the 11 cent spread was less than the necessary percentage mark-up required in that particular store. As a result, the goods were marked up to 49 cents and at that price they could not be sold. A discussion of this situation is outside the scope of this article, but the writer feels that the buyer was right. Evidently the public thought so too, and the public is always right, especially when it has the pocket-book.

Finally, there is the objection that the results are not good enough. For many fabrics this criticism is not valid, at least not in the initial stages of a new invention. For other fabrics, the criticism is warranted. The psychology of the name has been discussed previously and need not be repeated here. The effect of the depression has also been discussed. It is more important to remem-

ber that many fabrics do respond to the treatment satisfactorily, than to point out that many do not. At least it is more important if one has a progressive viewpoint. However, the objection is important enough to merit some discussion. Can the present method be improved? If so, how?

Returning to the properties of the urea-formaldehyde resins for a moment, how do these properties fit into the crease-resisting picture? First of all, the resin in the insoluble stage is a hard, horn-like mass. It is resistant to water, and fairly so to boiling soap solutions. It is resistant to dry-cleaning liquors, particularly of the paraffine type. It is not particularly elastic and sometimes one is inclined to wonder why it works anyway. Certainly without the guide-posts established by its discoverers (the wire-strengthened hose-pipe) it would have been the last thing in the world to be tried out for such a purpose. But the guide-post was up, the idea suggested a synthetic resin, and it worked, at least on some fabrics. However, if the resin itself could be made elastic, it is the writer's belief that it would work better. This might be done by incorporating a plasticiser in the resin liquor as is done with other resins and lacquers. But the plasticiser would have to be one that wets cotton, have a small molecule so it could penetrate the cotton fiber and not be injured by high temperatures. Perhaps such a product cannot be found today, but what of tomorrow? It seems natural to think of latex in this connection but apparently the size of the rubber molecule prevents it from penetrating the fiber. At least it has not worked out as yet.

It is quite possible that the many workers in the resin field will some day solve this problem. This field for research is very promising and the resin industry has grown rapidly during the past decade. Undoubtedly, an improved material which when incorporated in a fabric eliminates the objections cited above, will meet a quick response on the part of cotton and rayon finishers. And the public, which likes to look neat and trim, will not be far behind, if given a chance to know about it.

Already, many improvements have been made. By the use of selected catalysts with properly compounded resins, the temperature required for the final conversion has been reduced to such a point that it is no longer necessary to have special equipment if one has a good tenter frame, or a hot loop-dryer. However, it is not very expensive to put an electrical "booster" on an ordinary loop dryer and secure more rapid conversion of the resin with a resulting decrease in production costs.

Perhaps a word should be added concerning an attempt to obtain a finish which will render fabrics resistant to creasing and which employs a totally different method from those discussed previously. Gibbons has disclosed a method (U. S. Patent No. 1,980,676, dated Nov. 13, 1934, and assigned to Joseph Bancroft & Sons Co., of Wilmington, Del.) which makes use of a sizing prepared as follows: Fifteen gallons of casein solution containing 1 pound of dry casein and 2 ounces of tri-sodium phosphate are mixed with five gallons of 30 per cent latex solution containing two per cent zinc oxide on the dry rubber and two per cent piperidine penta-methylene dithiocarbamate. The latter material acts as an accelerator for the rubber. An ordinary sizing mangle can be used, the excess size being removed and the fabric is then dried. Subsequently, the fabric is washed in boiling soap solution to remove that part of the size which held the latex in suspension, presumably the casein component. In order to prevent the crossed yarns from adhering to one another, Gibbons works his fabric during the drying operation which is the method employed in the acid organdie process for the same purpose. Gibbons claims that this simple treatment produces a finish which is resistant to creasing without "imparting harshness or detracting from the desired amount of pliability necessary to the purpose of dress goods." Gibbons particularly indicates that his invention is suitable for voiles, pique voiles, and organdies but he further states that it can be employed successfully in connection with the finishing of other fabrics including those made of rayon.

The writer has not seen any fabrics finished by the Gibbons' process and consequently is unable to state how closely they approximate the results obtained by using urea-formaldehyde resins. One thing appears to be certain and that is that this method does not introduce the material *inside* of the cotton fiber. If the finished coating is essentially rubber, then it should give satisfactory pliability regardless of its location.

There is also considerable work being done on the use of an external film for producing crease-resisting finishes. The product which has been most widely experimented with to date is casein. Whether it is possible to produce a thin film which will give the proper elasticity to the yarn and still not be too stiff or too fragile remains to be seen. However, it is gratifying to know that there are reasonable signs of success using this material and certainly if the film is made waterproof and permanent by setting it with formaldehyde, it should impart those qualities to rayon marquisettes that are imparted by the urea-formaldehyde resins, that is fullness, freshness, and resistance to moisture soiling.

One perfectly good patent for securing crease-resisting finishes which seems to have escaped the attention of those interested in the field was issued to Heuck and Esselmann, Dec. 3, 1929. This is U. S. Patent No. 1,737,760 and is assigned to the I.G. The inventors use mono- or di-methylol urea as an impregnating agent for securing increased strength of rayon in the wet state, they claiming 100 per cent increase in strength. This is in line with the results secured by the writer when treating rayon by the Tootal process. As they use equivalent materials, the reason for the increase in strength must be the same and although the inventors did not comment concerning the crease-resisting properties, there can be no doubt that they are present. Heuck and Esselmann suggest using the aqueous solutions of mono- or di-methylol urea in

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Washington News Letter

By WALDON FAWCETT

DO THE current hearings, by Congressional subcommittees, on pooling of patents, etc., presage restrictive legislation at the next session of Congress? The question is in order in view of the attention by newspapers to the hearings in New York, and other cities. "Not necessarily" is, however, a warranted answer. The "reforms" in the patent system, which are, by implication, the objectives in the conferences this autumn are in no wise fresh proposals, nor yet do these, as perennial issues command extensive support in Congress.

Explanatory, in large measure of the present situation is the circumstance that, with Representative Sirovich, who happens to be the present Chairman of the House of Representatives Committee on Patents, several of the accepted practices of patent strategy are incitements to revolution. Notably, suppression of patents, and the furtherance of industrial monopoly via patent pools and exchanges of patent privileges. The investigative crusade authorized at the last session of Congress is thus, to a considerable extent, a personal hobby with the head of the Patent Committee. Backed by other lone plotters who would go so far as to purge the system whereby the inventions of staff chemists and other research workers and experimenters automatically become the property of employers. But, whatever the merits of the program expressed in the several disciplinary bills which have been introduced in Congress, it is unlikely that the final session of the present Congress will put any of the measures to vote. Indeed, it is problematical whether the House of Representatives (harried by belatedly aroused lobbies) will so much as place on the calendar the Duffy Copyright Bill and its design protective amendment.

THE CALL FOR STATISTICS AT CLOSE RANGE

Oddly enough, perhaps, the first reaction to the business census, on a grand scale, which is now in progress, is pressure not for statistics in greater detail, nor of greater scope, but for periodic records which will follow more closely the current state of business. The U. S. Bureau of the Census, for all its speeding up processes, has always had to face a certain amount of criticism because its findings have seldom been obtainable promptly enough to serve the purposes of technicians and executives who desire to make the census computations the basis of unfolding policies. Facing the consequences of the depression, the realignments of the New Deal, and other distractions, users of the Government statistics have become more and more insistent that the need is not for a bigger statistical layout but for a plan that will reckon, at short reach, with the business cycle and keep closely in step with the developments of the immediate period. Petitioners for more selective rather than more generous statistical fare cite certain urgent needs. Conspicuously, intimate man-hour statistics, information not now vouchsafed by U. S. Labor Statistics. Decentralization of statistics, via regional break-downs, is another volunteer prescription for improvement of facilities. A suggestion has been made that a subsidiary or successor of the Central Statistical Board might do valiant service by making a study of the statistical activities under the several NRA Code Authorities which are worthy to be taken over and perpetuated by the Government.

FABRIC SPECIFICATION AGAIN DELIMITED

The consistent policy at Washington to deny private appropriation of the designatory or descriptive terms generic to the common vocabulary of the textile industry has just found fresh expression. The firm of Sidney Blumenthal & Co., Inc., of New York has been denied permission to register the notation "Translucent" as a trade mark for knitted, netted and textile fabrics—"Products of the Shelton Looms." The especial significance of the rejection is found in the fact that application had been made under the Trade Mark Act of 1920, a Federal statute which was enacted by Congress with intent to provide authentication for trade names, etc., which are ineligible for enrollment under the nation's basic trade mark law, the Act of 1905.

Upholding the veto of the U. S. Examiner of Trade Marks, the First Assistant Commissioner of Patents ruled, on appeal, that "Translucent" must be denied entry to the trade mark register because this notation does not indicate origin of the goods (the prerequisite of every trade mark) but merely indicates one of the characteristics of the goods, viz, quality. Appraising the function of the word to be monopolized, the Patent Office reviewer observed that the labels in use on the textiles, provide four blank spaces for the purpose of indicating, respectively, "Piece No.," "Yards," "Quality" and "Color." In the third of these spaces, that accompanying the word "Quality," appears the notation "Translucent." Hence the conclusion that the term in question was merely a grade mark or a varietal mark. But it was on the score of lack of direction-pointing rather than sheer descriptiveness that the Commissioner turned down the notation, albeit admis-

sion was sought through the more liberal trade mark statute. He pointed out that if a trade term fails to indicate the origin of the product it cannot possibly be a trade mark and is no more entitled to registration under the act of 1920 than under the stricter statute of 1905.

THE TYING POWER OF COLOR

Marketing specialists at the Department of Commerce are heartened by the support which has recently come to them from art circles for their theory that merchandise consumption may be stimulated by encouragement of color sequences of diverse commodities associated in the same environment. Director Thelma M. Burrows of the Georgiana Studio of Design is an exponent of this doctrine. Discussing recently the trend, in the designs of today, to strength in color combined with rhythmic simplicity she added: "More products should tie together although manufactured by different people. The purchaser uses them in one room and considers the harmony. We have been enabled to pull together manufactured products that, though different in character, tie together in color and design."

THE YEAR IN FOOD COLOR CERTIFICATION

No new colors were added and no dyes were dropped, this past fiscal year, from the approved list at the Color Certification Section of the U. S. Food and Drug Administration. The certification for the twelve month period, with percentages represented by the respective colors was as follows:

Colors	*Pounds*	*Per Cent*
Orange I	103,801.0	26.79
Amaranth	87,189.0	22.49
Tartrazine	77,280.0	19.95
Ponceau 3R	43,791.0	11.30
Sunset Yellow FCF	23,989.0	6.19
Yellow OB	20,297.0	5.24
Yellow AB	12,141.0	3.14
Erythrosine	7,604.0	1.97
Ponceau SX	3,278.0	.86
Brilliant Blue FCF	2,641.0	.69
Indigotine	2,522.5	.65
Guinea Green B	909.0	.24
Naphthol Yellow S	811.0	.20
Light Green SF Yellowish	715.0	.18
Fast Green FCF	432.0	.11
	387,400.5	100.00
Repacked straight dye	40,950.0	
Mixtures	313,760.63	

ROUTINE CHEMICAL TESTING BURDENS STANDARDS BUREAU

The first half of the fiscal year 1936 shows little relief at the National Bureau of Standards from the overplus of chemical testing which has been familiar routine, these past few years, due primarily to the extension of Government activities under the New Deal. Tests made for the new alphabetical agencies of the Government have manifestly been mainly responsible for the increased load. For example, the thousands of tests of blankets made for the F.E.R.A. At the same time, this is not the sole explanation of the cumulation of chemical testing. Governmental activities outside the relief and public works programs have made considerable demands for analytical research. As an illustration of the trend of expansion it may be cited that in connection with the testing of paints, investigations have been made to improve various special paints, notably international orange for airways and white traffic paint for highways. Withal there is a consistent policy to devise testing systems which may be substituted for compositior requirements in the purchase of a variety of materials.

COLOR CLAIM REBUFFED

The Gillette Safety Razor Company has supplied the latest link in the chain of experience of the difficulties of establishing prior or superior rights to the use of distinctive or distinguishing color. The Gillette Company resented a "blue" invasion of the safety razor blade field by the Standard Safety Razor Corporation of Norwalk, Conn. Major privilege in the use of blue, in the particular commercial environment involved, was claimed by Gillette on the ground of priority of color planning and the circumstance that a considerable sum of money had been spent by Gillette in advertising the fact its blades were blue and were sold in a blue package. This pre-emption of blue having occurred long prior to the entry on the scene of the second capitalizer of blue was made a basis for a claim of property rights in the blue indicia. Federal arbiters dismissed the "Opposition" initiated by Gillette. On the familiar ground that exclusive ownership is not possible in colors or color-descriptive terms. Incidentally, it was emphasized that a background color is peculiarly bereft of the desired legal protection when foreground features are in no wise imitative.

LEGISLATIVE SUPPORT FOR NRA SUCCESSOR

Not so often metioned in the forecasts but, withal, one of the most interesting legislative responsibilities confronting Washington is the problem of facilities for the succession of NRA. It has been made manifest that dependence will be placed on the Trade Practice Conference —an institution that has had development over a period of nine years at the hands of the Federal Trade Commission. But there remains the question of whether any supplementary or amendatory legislation will be necessary or desirable to fit this vehicle for its larger destiny as an instrument for the self-government of business.

Two separate and distinct approaches lead to the issue. On the one hand the desires of the New Deal Administration. On the other hand, the ideals and concessions of the trade associations, industrial institutes and technical organizations which seek to preserve the good and discard the deficient in the old structure of the NRA as a medium for the cooperative promulgation of standard ethics of fair trade practice. Not the least of the possible complica-

(Continued on page 665)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists
NOVEMBER 18, 1935

Officers of the Association

ROBERT E. ROSE, *President*
E. I. Du Pont de Nemours & Co., Wilmington, Del.

A. R. THOMPSON, Jr.—WILLIAM H. CADY, *Vice-Presidents*

WILLIAM R. MOORHOUSE, *Treasurer*
National Aniline & Chemical Co., Boston, Mass.

HAROLD C. CHAPIN, *Secretary*
Lowell Textile Institute, Lowell, Mass.

LOUIS A. OLNEY
President Emeritus and Chairman of the Research Committee
Lowell Textile Institute, Lowell, Mass.

Councilors-at-Large

JOSEPH F. X. HAROLD — WILLIAM D. APPEL
DONALD H. POWERS — HUGH CHRISTISON
CARL Z. DRAVES — HENRY F. HERRMANN

Councilors Representing Sections

BEN VERITY (Rhode Island) — EUGENE C. KNAEBLE (Philadelphia)
HANS MEYER (New York) — B. C. BLOWNEY (Midwest)
ROLAND E. DERBY (N. New England) — G. H. DUBOIS (South Central)
CHARLES B. ORDWAY (South Eastern) — RICHARD M. MITCHELL (Piedmont)

Local Sections and Their Officers

Northern New England Section
Roland E. Derby, Chairman, M. T. Stevens Co., No. Andover, Mass.
John N. Dalton, Secretary, Pacific Mills, Worsted Division, Lawrence, Mass.

Rhode Island Section
John G. Masson, Chairman, Rosemont Mill, Woonsocket, R. I.
Raymond A. Pingree, Secretary, 7 Sayles Ave., Saylesville, R. I.

New York Section
Ephraim Freedman, Chairman, Bureau of Standards, R. H. Macy & Co., Broadway and 34th St., New York, N. Y.
P. J. Kennedy, Secretary, E. I. duPont de Nemours & Co., Inc. 61 Thomas St., New York, N. Y.

Philadelphia Section
Robert E. Sullivan, Chairman, Anchor Thread Co., Groveville, N. J.
R. W. Delaney, Secretary, National Aniline & Chemical Co., 200 S. Front St., Philadelphia, Pa.

Piedmont Section
Paul Haddock, Chairman, P. O. Box 1888, Charlotte, N. C.
T. R. Smith, Secretary, Wiscasset Mills Co., Albemarle, N. C.

South Central Section
Harold Schroeder, Chairman, Dixie Mercerizing Co., Chattanooga, Tenn
Harvie Bruce Kimbrell, Secretary, Dixie Mercerizing Co., Chattanooga, Tenn.

Midwest Section
Arthur T. Brainerd, Chairman, Ciba Co., 325 W. Huron St., Chicago, Ill.
Elias A. Johnson, Secretary, National Aniline & Chemical Co., 357 W. Erie St., Chicago, Ill.

South-Eastern Section
C. A. Jones, Chairman, Georgia School of Technology, Atlanta, Ga.
W. F. Crayton, Secretary, Dimon Apt. Columbus, Ga.

Lowell Textile Institute Student Section
Herbert A. Wormwood, Chairman; Henry S. Anthony, Secretary

North Carolina State College Student Section
A. E. Shumate, Chairman; J. W. Furr, Secretary

Members should notify the **Secretary** immediately of all address changes

ANNUAL MEETING AND CONVENTION

DECEMBER 6 AND 7
CHATTANOOGA, TENN.
Headquarters: Read House

ANDREW J. KELLY
Chairman
General Arrangements Committee

CARL Z. DRAVES
Chairman
Technical Program Committee

PROPOSED AMENDMENT TO THE CONSTITUTION

THE first sentence of Article VIII of the Constitution now reads: "The officers of this Association shall be elected at an annual meeting called in December by the Council, and shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and six Councilors-at-Large." We propose that there be substituted the sentence, "At an Annual Meeting in December, called by the Council, there shall be elected a President, two Vice-Presidents, a Treasurer, and as many Councilors-at-Large as may be required to bring their total number to six. A Secretary shall be appointed by the Council."

In paragraph two of the same Article VIII is the sentence, "Any person who has served for three consecutive years as an elected member of the Council shall be ineligible for re-election as an officer or Councilor-at-Large for a period of one year; provided, however, that the office of President, Secretary and Treasurer shall not be affected by this rule." We propose that the word Secretary be removed, if the first sentence of Article VIII be amended as here proposed.

Signed,

W. D. APPEL
J. ROBERT BONNAR
W. H. CADY
H. C. CHAPIN
HUGH CHRISTISON
H. D. CLAYTON
R. E. DERBY
CARL Z. DRAVES
H. F. HERRMANN
E. C. KNAEBLE
H. W. LEITCH
W. R. MOORHOUSE
GEORGE A. MORAN
LOUIS A. OLNEY
R. E. ROSE
BEN VERITY

MEETING, SUB-COMMITTEE ON MERCERIZATION

MEMBERS of this Sub-Committee please make arrangements whereby they can attend the meeting which will be arranged for either Friday evening or Saturday morning (Dec. 6th or 7th, respectively), in Chattanooga. Exact time of meeting will be posted on bulletin board at the Read House, Chattanooga, on Friday, Dec. 6th.

The research assistant, Sidney M. Edelstein, will be present and there will be important matters regarding the research program that require full discussion.

CHARLES B. ORDWAY, *Chairman,*
Sub-Committee on Mercerization.

Technical Program

Annual Meeting

December 6th and 7th

Chattanooga, Tenn.

FRIDAY, DECEMBER 6

7:30 to 9:30 P. M.

"A Resume of the Properties and Uses of Ultra-violet Radiation"—with demonstration. JOSEPH L. MCEWEN, *National Aniline & Chemical Co.*

"The Application of Optical Instruments in the Textile Industry for Routine and Research"—with an extensive exhibit. J. H. SCHERING, *Bausch & Lomb Optical Co.*

"The Eyes of Science" — a motion picture. J. H. SCHERING, *Bausch & Lomb Optical Co.*

SATURDAY, DECEMBER 7

9:30 A. M. to 12:00 and
2:00 P. M. to 5:00 P. M.

"Accelerated Aging Test for Weighted Silk." WILLIAM D. APPEL and DANIEL JESSUP, *National Bureau of Standards.*

"The Chemistry of Wool and Its Relationship to Practical Processing." MILTON HARRIS, *A.A.T.C.C. Research Associate at National Bureau of Standards.*

"Cotton Printing: An Outline." SAMUEL I. PARKER, *Ciba Co.*

"Some Recent Developments in the Application of Sulfur Dyestuffs." JOHN L. CRIST, *Calco Chemical Co.*

"The Influence of the Finishing Operations on the Light Fastness of Vat Dyeings." CHAS. SEIBERT, *E. I. du Pont de Nemours & Co.*

"New Developments in the Application of Naphthols and Vats for Dyeing and Printing." S. H. WILLIAMS, *General Dyestuff Corporation.*

"Comparative Tests for Value of Sulfur Trioxide in Different Amounts in Sulfonated Oil." ALBERT H. GRIMSHAW, *North Carolina State College.*

"A Review of Recent Analytical Methods with Special Applications to Textile Analysis." IRVING W. GROTE, *University of Chattanooga.*

"Activities of the Raw Silk Committee of the National Association of Hosiery Manufacturers." E. M. SCHENKE, *Research Associate, National Association of Hosiery Manufacturers.*

"Conditioning Water for the Textile Industry." H. H. MORRISON, *The Permutit Co.*

"Synthetic Resins: Their Development and Application to Textiles." D. H. POWERS, *Röhm & Haas Co.*

"Peroxide Bleach Baths and Some Factors Influencing Their Stability." D. J. CAMPBELL, *R & H Chemicals Dept., E. I. du Pont de Nemours & Co.*

Proceedings of the American Association of Textile Chemists and Colorists

Abstracts of Papers

to be Presented before the Annual Meeting in Chattanooga, Tenn., December 6th and 7th

"A Resume of the Properties and Uses of Ultra-violet Radiation."

JOSEPH L. MCEWEN, *National Aniline & Chemical Co.*

Abstract

The nature of ultra-violet radiation is explained; the history of this interesting subject is related; unusual effects of ultra-violet radiation are described; industrial applications are given, especially those of interest to the textile chemist.

"An Accelerated Aging Test for Weighted Silk."

WILLIAM D. APPEL and DANIEL A. JESSUP, *National Bureau of Standards.*

Abstract

The rate at which silk and particularly weighted silk will deteriorate on exposure to light, heat and moist air cannot be predicted simply from the amount of weighting or other substances present on silk. A laboratory test which will indicate the relative stability of silk is needed.

The aging, as revealed by changes in breaking strength, of a variety of silk and weighted silk cloths in dark storage, when exposed to the daylight received through a north window (natural aging), and when exposed to the radiation from the glass-enclosed carbon-arc lamp under controlled conditions of temperature and relative humidity of the atmosphere (accelerated aging) was studied.

Data on the accelerated aging of some typical silk dress fabrics were obtained. An accelerated aging test is proposed.

"The Chemistry of Wool and Its Relationship to Practical Processing."

MILTON HARRIS, *A.A.T.C.C. Research Associate at National Bureau of Standards.*

Abstract

The purpose of this talk is to report the progress which has been made by the three associates of the A.A.T.C.C. in the field of wool and to indicate some of the applications of the results to practical wool processing.

Wool contains relatively strong acidic groups which account for the affinity for acid dyes and basic groups which take up acid in the carbonizing process. There are two types of basic groups in wool: namely, the free amino groups which are readily removed by treatment with nitrous acid and arginine groups which lose little, if any, of their basic properties when treated with the same reagent. A method for the quantitative determination of these groups was worked out.

The molecule composing wool also contains twelve per cent of the sulfur containing amino acid cystine, which biochemists have found important in studies of arthritis, diabetes and cancer. It has been found that the susceptibility of wool to alkaline reagents is closely associated with the lability of the cystine sulfur in alkaline solutions. Oxidizing and reducing agents attack these sulfur groups and make the wool even more susceptible to alkaline treatments. The effect of oxidation on the susceptibility of wool to alkalies may be utilized as a practical method for testing bleached cloth and for controlling the bleaching operation.

"Cotton Printing: An Outline."

SAMUEL I. PARKER, *Ciba Company.*

Abstract

This paper presents an outline of the general subject of printing in a non-technical manner primarily for dyers who have not visited a print works. The subject is developed under the following items: (a) History, (b) Development in the South, (c) The Printing Machine, (d) Treatment of Cloth Before and After Printing, (e) The Engraving Shop and (f) The Color Shop.

"Some Recent Developments in the Application of Sulfur Dyestuffs."

JOHN L. CRIST, *Calco Chemical Co.*

Abstract

Some recent developments in the application of sulfur dyestuffs are presented under the following headings:

1. Standing vs. single bath methods.
2. The proper functioning of exhausting materials.
3. Additive ingredients to assist reduction.
4. Subsequent processing.
5. Tendering.
6. Selection of types for compounded shades.

"The Influence of the Finishing Operation on the Light Fastness of Vat Dyeings."

CHAS. SEIBERT, *E. I. du Pont de Nemours & Co.*

Abstract

Simultaneous oxidation and finishing produce the brightest colors and the best light fastness.

When bichromate is the oxidizing agent the light fastness may be influenced by the time and temperature of the treatment and by the concentration of the bichromate solution.

Substitutions of "Gardinols" for the saop usually used increases the light fastness of many of the dyestuffs. The greatest increase in light fastness is obtained with those dyestuffs which normally possess the least resistance. The shade change and loss in strength in the finishing operation are lessened. The substitution does not affect the resistance to laundering. Maximum resistance to both laundering and light can be obtained in less time and at a lower temperature by the use of sulfated fatty alcohols.

"Comparative Tests for Value of Sulfur Trioxide in Different Amounts in Sulfonated Oil."

ALBERT H. GRIMSHAW, *North Carolina State College.*

Abstract

The purpose of the paper is to find an answer to the question of which is of greater importance in determining the value of a sulfonated compound, the content of sulfur trioxide or of total fat.

The tests for sulfonated products include the following: (1) stability of aqueous solutions toward acid, alkali, lime and heat; (2) wetting power in the presence of acid, alkali, and lime at room temperature and at 60° C. as measured by the Draves method and by the rosette method; (3) relative dispersion using charcoal, a vat dye and an acetate dye; (4) effect on the stiffness of starched fabrics.

"Peroxide Bleach Baths and Some Factors Influencing Their Stability."

D. J. CAMPBELL, *R & H Chemicals Dept., E. I. du Pont de Nemours & Co.*

Abstract

The properties of hydrogen peroxide, sodium peroxide and sodium perborate are briefly described, and their application in the textile industry for bleaching and other purposes is presented. The preparation of sodium peroxide bleaching solutions and the importance of the stability of these solutions to the bleacher is discussed in some detail, together with the various factors that influence their stability under plant conditions.

"Activities of the Raw Silk Committee of the National Association of Hosiery Manufacturers."

E. M. SCHENKE, *Research Associate, National Association of Hosiery Manufacturers.*

Abstract

Since the hosiery industry has grown to be the major consumer of raw silk, it is but natural that the Raw Silk Committee of the National Association of Hosiery Manufacturers has for several years been engaged in the development of test methods and the establishment of grades for this commodity.

The committee has developed a new method for measuring the "evenness" of raw silk. It has established standard grades of color, white ivory and cream, in the form of enamel plaques. It has described the various possible causes of "Two-Tone," and the corresponding means of guarding against these defects, and it has defined the various types of cleanness and neatness defects.

In order to show the effects of variations in the qualities of raw silk upon the properties of the finished hosiery, the committee found it necessary to set up a definition to distinguish between first and second grade hosiery.

"Conditioning Water for the Textile Industry."

H. H. MORRISON, *The Permutit Co.*

Abstract

The processes and equipment used in treating textile water supplies are presented. The following topics of interest in the purification of water are discussed: the characteristics of various surface and ground water supplies; the deleterious substances present and the methods used for their removal including coagulation, settling and filtration; color removal; pH control; use of clay and activated carbon; acid feeding for reduction of alkalinity; removal of iron and manganese; softening of water with zeolites.

"A Review of Recent Analytical Chemical Methods with Special Applications to Textile Analysis."

IRVING W. GROTE, *University of Chattanooga.*

Abstract

A short summary of some of the newer methods will be given, especially those developed in the bio-chemical field, and including: (1) oxidation-reduction indicators with their possible textile application in determining the strength of bleach, reducing and oxidizing baths, (2) absorption indicators and their application and (3) micro and spot analysis.

(Continued on page (332) 658)

Proceedings of the American Association of Textile Chemists and Colorists

ANNUAL MEETING AND CONVENTION

HEADQUARTERS

The Read House

CHATTANOOGA, TENNESSEE

We are informed that the Read House, headquarters for the Annual Meeting in Chattanooga, has filled its reservation capacity for the convention and requests for reservations are now being sent to the Hotel Patten pictured below. Convention facilities at the Read House are said to be all that can be desired. According to a Chattanooga newspaper it is expected that around 600 will attend the meeting.

A WORD TO THE WIVES

HERE comes a wail from Chattanooga. It is the chairman of the ladies' committee trying to get a word in edgeways. She says that determined efforts are being made to provide such distractions that no visiting wife will feel any urge to sit in on the technical papers.

For example, Mrs. H. O. Shuptrine herself, in person, is handling arrangements for bridge and she says that there will be prizes. Mrs. Fletcher Kibler, the wife of a new member, plays golf and can lead the way to any or all of three courses. Mrs. H. A. Rodgers and Mrs. C. A. Schier will provide cars and drivers so that the local scenery (and it is real scenery at that) may be enjoyed under better conditions than when friend husband drives. The local Women's Club is hanging new draperies, the press photographers are polishing up their lenses and the society editors are sharpening up their pencils. There are also movies and a definite spirit of hospitality is in the air.

The chairman, herself, who does not play bridge, keeps golf clubs with the vacuum cleaner accessories and who has viewed the scenery will be found on the mezzanine floor of the Read House with a file of the latest movie magazines and a good memory for luscious bits of scandal. She suggests that you bring your dance frocks as they will be needed.—From MRS. HAROLD SCHROEDER, Chairman, Ladies' Committee.

BANQUET AND DANCE

THE chairman of general arrangements for the Chattanooga convention wishes to point out that the dinner and the dance to follow (Saturday night) will not be formal in that anybody will be expected to wear what Fred Astaire calls "white tie, top hat and tails." Those who already own boiled shirts may put them on but there is no need to rush out and rent one. Those who were at the last Chattanooga annual meeting will remember the dance which followed the banquet and the lovely young ladies. The committee on arrangements wishes to point out that five years have gone by but these young ladies have younger sisters who may be expected to be at this dance.—From WILLIAM J. KELLY, JR., Chairman, General Arrangements.

COMMITTEES and CHAIRMEN

TECHNICAL PROGRAM
Carl Z. Draves
Ludlow Mfg. Associates

ENTERTAINMENT, PUBLICITY AND GENERAL ARRANGEMENTS
William J. Kelly, Jr.
Burkart-Schier Chemical Co.

Textile Ball
A. Henry Gaede
Laurel Soap Mfg. Co.

Scenic Outings
Harry H. Morrison
Permutit Co.

Ladies
Mrs. Harold Schroeder
Chattanooga, Tenn.

Reception
Walter E. Hadley
Standard-Coosa-Thatcher Co.

Railroad and Transportation
John L. Dabbs, Jr.
E. I. duPont deNemours & Co.

Registration
Herbert A. Rodgers
National Aniline & Chemical Co.

The Hotel Patten is only two blocks away from the Read House and those who were unable to obtain accommodations at the Read House are assured of a room here. Two hundred rooms are available at the Patten and they are of exactly the same type as those at the Read House.

Proceedings of the American Association of Textile Chemists and Colorists

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

Note: Persons who have obtained employment should notify the secretary at once. Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

A-6

Education—Analytical Chemistry and Dyeing Course, Lowell Textile Evening School.

Experience—Seven years as print color and dye chemist in printing, dyeing and finishing plants; recently in charge of textile printing department of dyestuff manufacturer.

A-B-2

Education—Lowell Evening Textile School, 1917.

Experience—Five years' experience in hosiery dyeing, full fashioned hosiery of silk and cotton and silk, also men's hosiery containing rayon, wool, cotton and celanese. Several years experience in laboratory work. Has also had experience in jig-dyeing of cotton piece goods, slub and top dyeing.

A-B-4

Education—B.T.C. 1934, Lowell Textile Institute.

Experience—Assistant chemist in cotton knitting plant; second-hand in woolen knit goods dye house. Will go anywhere; references.

A-B-5

Education—Graduate of the University of Lausanne, Switzerland. Doctor's degree in Chemistry. Knowledge of French and German.

Experience—Eleven years with large bleaching, dyeing, printing and finishing plant as assistant Chemist and then Chemist in charge of the Laboratory. Experience in dyeing and printing cotton and rayon fabrics; research and analytical work. Woman.

A-B-7

Education—Evening school in textile dyeing.

Experience—2 years laboratory in dyehouse; 9 years dyer and foreman on hosiery, ribbons and rayon; 2 years assistant to superintendent. Can handle help efficiently. Desires position as supervisor or demonstrator of dyestuffs. Age 30; married. Prefers vicinity of New York.

A-B-C-2

Education—Graduate of Lewis Institute of Engineering of Chicago and graduate of Philadelphia Textile School (Chemistry and Dyeing department).

Experience—Has had extensive experience as assistant chemist and colorist in silk printing, dyeing and finishing; also dyeing raw stock wool; and dyeing and finishing cotton and rayon. Age 30; married; references.

A-B-C-3

Education—3 years at Brown University and Drexel Institute.

Experience—2½ years in dyestuff laboratory; 3 years as second-hand, dyeing indanthrene and direct colors on rayon skeins; 6 months as boss dyer on silk and cotton ribbons and hosiery; 3 years overseer of dyeing and finishing rayon tubing. Can handle laboratory, dyehouse, finishing or outside service. Age 30; married.

A-B-C-4

Education—Graduate, University of Michigan, in Chemical Engineering, 1930.

Experience—One year as assistant chemist and research engineer with metallic packing concern. Three years' experience dyeing and finishing rayon tubing, last two years being foreman dyer. Familiar with other kinds of dyeing. Working knowledge of Spanish. Age 28. Married. References.

A-B-D-E-F-1

Education—Ph.D. in Chemistry, Pennsylvania, 1927. Graduate Work in Chemical Engineering, M.I.T., 1928.

Experience—5 years college teaching, 11 years industrial development and consulting work in diversified fields relating to textiles. Successful organizer and director of development and research. Married. Publications. Position must have opportunity for advancement.

A-B-C-F-1

Education — Five years chemistry and engineering, Brown University (Evenings).

Experience—1 year general superintendent at print works (shirtings, dress goods, etc.; cotton and rayon). 12 years chief chemist and superintendent of large bleachery and dyeworks (cotton, rayon and silk piece goods). 4 years chemist in charge of control work in bleach, print and dye works (cotton, wool and rayon piece goods). 9 years chief chemist and assistant superintendent in gas and oil manufacture. Practical dyer and finisher and can handle help efficiently and get results. Can help a plant seeking to improve their vat dyeing, shrinkage results, finishes and service to customers. Age 45; married.

A-C-1

Education—4 years at Newark Evening Technical School in Chemical Engineering.

Experience—8 years in manufacturing, research, testing of soaps, oils, gums and finishes and application of same in all phases of the textile industry. Age 23, single. References.

A-E-1

Education—Ph.D., Univ. of Illinois, studied chemical engineering at Columbia, licensed chemical engineer, New Jersey.

Experience—10 years' experience teaching in colleges, subjects included chemical and textile subjects. Has had broad experience in industrial work including experience in testing materials, research and consulting. Will go anywhere; references.

B-1

Education—Educated and trained in chemistry and calico printing in Glasgow, Scotland.

Experience—Has been with large print works as colorist for 13 years producing first class work on cotton, rayon, wool and silk fabrics. References.

B-2

Experience—Boss dyer with one firm for 18 years, divisional supt. at print works for 1 year, in charge of processing and dyeing of cottons and rayons at large bleachery for 6 years. Prefers bleachery in East but will go anywhere. References.

B-3

Experience—Foreman piece dyer for the past 21 years. Can dye the following: celanese, rayon, cotton backs, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

B-6

Education—Graduate R. I. School of Design.

Experience—5 years in bleachery, 7½ years as assistant dyer, 2 years as boss dyer and 3 years as superintendent of dyeing and finishing. Married, 33 years old. References.

B-7

Experience—Eight years as boss dyer on skeins and ribbons. Over ten years as chemist and head dyer for a large hosiery mill. Experienced on Silk, cotton, rayon and wool in skeins, ribbons, piece goods and all kinds of mixtures. Willing to go anywhere. Not afraid to work or face responsibility. Can handle help efficiently.

B-8

Education—Chemistry and Dyeing Department, Philadelphia Textile School.

Experience—Eleven years experience as chemist and boss dyer on the following: woolen, worsted and cotton yarn; woolen, worsted and union piece dyes on both ladies' and men's wear; wool, cotton, shoddy and mohair raw stock. Age 33, married, will go anywhere. References.

B-9

Experience—Hosiery dyer with fifteen years' experience on high grade silk hosiery; familiar with all types of machines. Age 43, married. Will go anywhere.

B-14

Education—Rhode Island School of Design.

Experience—Familiar with all classes of wool dyeing. Seven years with large carpet mill as dyer and processor of washed oriental rugs. Will go anywhere, married, 37 years old. References.

B-15

Education—B.T.C., Lowell Textile Institute, 1934.

Experience—Experience in dye house running washers, dye kettles and as a dye weighter.

B-17

Education—Lowell Textile Institute (Chemistry and Dyeing Course) 1916; extension courses at Brown University.

Experience—6 months dyeing wool at finishing company; 2½ years research work on bleaching, dyeing and finishing at dye works; inspector of textile equipment, U. S. Ordnance Dept., during war; 15 years as superintendent of dyeing at finishing company, including all types of colors on cotton piece goods and some rayon and celanese; handled chemical work at last named plant for many years as well as dyeing. Age 40, married, prefers East. References.

Abstracts—

(Continued from page (328) 654)

"The Application of Optical Instruments in the Textile Industry for Routine and Research".

J. H. SCHERING, *Bausch & Lomb Optical Co.*

A history of the use of optical instruments in the textile industry is presented, followed by a review of the most recent equipment available for routine control and research development.

The compound microscope has been particularly valuable for the identification of fibers and more recently has been used for distinguishing the different kinds of rayon. The microscope is also of great value in studying the cooking of starch.

In the silk industry the wide field binocular microscope and the Bausch & Lomb textile projector are of great value for finding defects in silk piece goods.

In the woolen industry, the greatest interest for the moment is directed toward an attempt to standardize the grading of wool tops by actually measuring the fiber diameter of a number of fibers.

The polarizing microscope can be used for studying the proportion of mature and immature fibers in a given supply of raw cotton.

MEETING, NORTHERN NEW ENGLAND SECTION

A MEETING of the Northern New England Section was held at the Hotel Manger, Boston, on Friday, November 1st, with 75 present.

Roland Derby, Chairman, opened the meeting, announced the annual meeting in Chattanooga, December 6 and 7 and advised those who plan to attend to communicate with Dr. Chapin regarding transportation arrangements.

Mr. Derby then introduced R. E. Rose, President of the National Association, who gave a short talk on the A.A.T.C.C. and its growth.

D. H. Powers of Rohm & Haas Co. was introduced and gave a very descriptive and interesting talk on "Synthetic Resins and Their Textile Applications."

Respectfully submitted,

JOHN N. DALTON,
Secretary.

MEETING, NEW YORK SECTION

THE New York Section met at the Elm Golf Club in Paterson, N. J., on Friday, October 4.

Dwight L. Johnson, of the Textile Research Department, Procter & Gamble Co., spoke on, "Possible Causes of Troubles in Processing Heavy Weight Silk and Rayon Fabrics", outlining with charts the various procedures in processing of pure silk and rayon. Mr. Baxter opened the discussion, and was followed by many others, with questions on some unusual problems, as for example, the processing of rayon in which tinsel is incorporated.

A brief report on the socially and financially successful outing was presented by Mr. Herrmann, Chairman of the Outing Committee. Pictures of the outing were shown by the Chairman of the Section under the title, "Ephraim Freedman Presents".

There was a total attendance of 44.

Respectfully submitted,

P. J. KENNEDY,
Secretary.

MEETING, NEW YORK SECTION

THE New York Section met in the Chemists' Club, New York City, on Friday, October 25th. William D. Appel spoke on, "Consumer Specifications and the A.A.T.C.C.", and D. E. Douty on, "Consumer Technical Information, Its Preparation and Distribution." There were many questions, particularly from Dr. Harold.

Dr. Meyer spoke on the work of his committee on "crocking".

It was indicated that about six to eight of the local members plan to attend the Annual Meeting in Chattanooga.

There was an attendance of 42.

Respectfully submitted,

P. J. KENNEDY,
Secretary.

CALENDAR OF COMING EVENTS

* * *

Meeting, Philadelphia Section, Broadwood Hotel, Philadelphia, Pa., November 22, 1935.

* * *

Meeting, New York Section, Elm Golf Club, Paterson, N. J., November 22, 1935.

* * *

Annual Meeting and Convention, Chattanooga, Tenn., December 6 and 7, 1935. Headquarters: Read House; General Chairman: William J. Kelly, Jr.

AMERICAN
DYESTUFF
REPORTER

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Technical Program

WE wish to call the attention of those members of the American Association of Textile Chemists and Colorists who plan to attend the Annual Meeting in Chattanooga that the abstracts of many of the papers which will be presented at the meeting appear in the Proceedings of the Association in this issue of the REPORTER. As we stated in our last issue these abstracts should be of immense value in promoting intelligent discussion following each paper and we urge you to study these abstracts so that you will be in a position to get every possible benefit to be derived from the papers. Many facts of importance are often brought out during the discussion which would otherwise be unpublished and this is of great importance not only to those who take part in the discussion but to those who read the published account.

To those persons who have not been planning to attend the Annual Meeting we hope the excellent technical program and the publication of the abstracts will prove of sufficient interest to cause them to be present. In addition to the technical program many other interesting features have been planned by the various committees to make your visit to Chattanooga an interesting one and we hope that you will be able to take advantage of the various efforts which have been made in your behalf.

"Synthetic Wool"

ACCORDING to a report of the U. S. Commerce Department's Chemical Division in Rome a new fiber known as "synthetic wool" has now passed the experimental stage and is being produced on a commercial scale. The new product is made from casein, a by-product of the dairy industry, in the same manner as rayon is produced. Casein is extracted from skimmed milk by the usual process, made soluble in a chemical bath, and the resulting viscous solution forced through a spinneret thus forming the threads. It is stated that, except for the chemical treatment for which special apparatus is required, the new fiber is produced with the same equipment as used in the manufacture of rayon.

Among the valuable features claimed for this fiber are the following: Owing to the presence of a smaller amount of sulfur which is said to reduce the warmth of natural wool the synthetic product is said to have even greater heat conserving properties than natural wool and for the same reason the new fiber is supposed to take dye more evenly. As in the case of rayon the casein product can be produced in the fineness and staple desired.

It is expected that by the end of November the daily output will exceed 2,000 pounds and that by next June it will reach 50,000 pounds each day. One pound of coagulated skimmed milk will produce one pound of the "synthetic wool" and so the cost of the new fiber will be determined in large part by the cost of the casein.

Casein already is used to considerable extent in this country especially in the paper industry. The U. S. output in 1934 amounted to 37,330,000 pounds which accounted for 96 per cent of our requirements.

Experimental work has been conducted in various countries on similar fibers but we do not know of any that have been accepted to any extent and it will be of interest to watch the progress of this fiber.

Just how well the new fiber will be received and to what extent it will replace the other fibers remains to be seen and that will not take place until it has passed through all the manufacturing and wet processing stages to the finished fabric and tried by the consumers here and abroad.

Plan to attend

Annual Meeting and Convention
December 6 and 7
Chattanooga, Tenn.
A.A.T.C.C.

● COMMUNICATION

Re Dye Kettle Construction

Editor,
AMERICAN DYESTUFF REPORTER,
Dear Sir:—

Just recently we read an article in your July 29th issue by Mr. Henry Barker Burke on dye kettle construction. While we agree in general with Mr. Burke's article, we would like to make a few comments relating to construction where stainless steel is used in conjunction with wood. We judge he refers to light gauge linings in wooden vats.

We are well aware of the possibility of pitting and corrosion that may occur when wood or other foreign materials are in contact with stainless steel in the presence of moisture. This is a definite and well understood form of corrosion, generally referred to as "contact corrosion." This can be eliminated by observing several precautions when installing light gauge linings in wooden vats or tubs.

If an old tub or vat is to be lined, we recommend the following:

(1) Boil out with caustic solution to neutralize any acid that may be present in the wood.

(2) Allow tub to dry.

(3) Paint inside of tub with an asphalt paint able to withstand boiling temperature.

(4) Paint outside of lining with same paint.

(5) Insert tar paper covering between lining and tub.

(6) Use welded joints instead of solder which may leak and permit moisture to penetrate between lining and wood.

The above is also applicable when new wooden vats or tubs are used; however, the caustic boil will not be necessary.

While we agree very heartily with Mr. Burke that solid stainless steel construction has many advantages and is a more desirable form of construction than linings, we know that if the above precautions are observed, linings will be resistant to corrosion when in contact with wood.

Very truly yours,
REPUBLIC STEEL CORPORATION
(Central Alloy District)
M. J. R. Morris, C. M. E.
By G. W. Hinkle.

● R. I. CHAPTER, LOWELL TEXTILE ALUMNI

The regular meeting of the Rhode Island Chapter of the Lowell Textile Institute Alumni Association was held on October 3, 1935 at the Narragansett Hotel in Providence. Twenty-four members were present. Following the business meeting, Fred G. LaPiana of Stein, Hall & Co. spoke on the finishing of rayon fabrics, which was followed by open discussion. At the next meeting, Henry L. Scott of the Henry L. Scott Co., will speak and also conduct a tour of the laboratory and plant of that company.

● BOOK REVIEW

The Handbook of Chemistry and Physics. 20th Edition. Chas. D. Hodgman, M.S., Editor-in-Chief, published by the Chemical Rubber Publishing Company, Cleveland, Ohio, 1935. Pages 1951. Price $6.00. Special price to Teachers and Students.

The 20th edition of the Handbook of Chemistry and Physics which has just come from the press presents over three hundred pages of new composition, a number of the tables have been completely revised and rewritten, and many pages of wholly new material have been added. In addition, minor revisions have been made more or less throughout the book.

The large table of physical constants of organic compounds has been completely enlarged in scope and entirely changed in form. These tables as now published not only include physical constants of organic compounds, but a formula index of, and rules for naming organic compounds, the pronunciation of chemical words, and the prefix names of organic radicals. A collection of tables has also been added giving in considerable detail the properties of amino acids. Dr. Austin M. Paterson of Antioch College, who is an authority on chemical nomenclature has cooperated in the editing of these tables and in unifying and correcting the nomenclature throughout the book. The International Union rules for the naming of organic compounds has been adopted and is fully explained as an introduction to the tables. Considerably more than a thousand compounds have been added to the list.

As previously the book is divided into five sections as follows:

1. Mathematical Tables.
2. Properties and Physical Constants.
3. General Chemical Tables.
4. Heat and Hygrometry, Sound, Electricity and Light.
5. Quantities and Units and Miscellaneous Tables.

The Sections dealing with X-Ray Spectra, Magnetic Optic Rotation, Colorimetry and Photometry have been revised and greatly extended.

Chemistry and Physics have always been closely related sciences, but developments of research during recent years have brought them into much more intimate relations than ever before. It is therefore essential for the chemistry student of today to have a reference book which gives, in as complete and as condensed a form as possible, such physical data as may be essential for his work. This latest edition of the Handbook of Chemistry and Physics will furnish such a reference book. Furthermore, the present volume has been so completely revised and brought up to date that it should replace earlier editions in the chemist's library.

Attend the Annual Meeting and Convention
A.A.T.C.C.
Chattanooga, Tenn.
December 6th and 7th

The Direct

Dyeing of Cellulose*

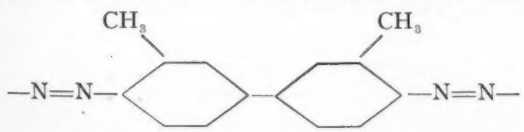
Influential Factors Controlling Dye Absorption

By S. M. NEALE, M.Sc.

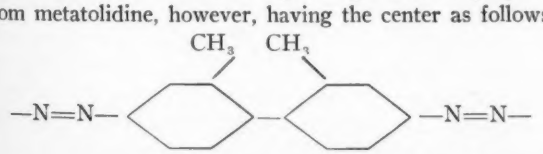
IN previous articles† an account was given of the results of recent quantitative investigations of the absorption of direct dyestuffs by cellulose and the effects upon the absorption of the time of dyeing, and of the temperature, concentration and salt content of the bath, were briefly discussed.

Another factor of primary importance is the constitution of the dyestuff concerned, which determines its dyeing properties as well as its color, and fastness, etc. It is not easy, however, to make any generalizations with regard to this as the constitutions of the great majority of colors in current use have not yet been disclosed and, even where this is not so, the relation between constitution and dyeing properties is very complex and difficult to follow.

Most direct colors are made soluble to water by incorporating in their structure from one to four sulfonic acid groups, and other things being equal, increase in the number of sulfonic groups tends to increase the solubility in water and to decrease the affinity for cellulose. Very slight changes in the positions of substituent groups are, however, often effective in causing great changes in dyeing properties. Benzopurpurin *n*B, for example, is prepared by tetrazotizing orthotolidine and coupling with naphthionic acid so that the center of the molecule has the form—



This dyestuff has a very strong affinity for cellulose, and exhausts well. The corresponding substance prepared from metatolidine, however, having the center as follows:



has very little affinity for cellulose, so that it cannot be used as a dyestuff. This illustration shows that the precise shape of the molecule as well as the nature and position of the active substituent groups, is of great importance in dyeing.

The relation between constitution and substantivity is best regarded as the province of the dyestuffs' manufacturers themselves, as they have available a great deal of information not accessible to others.

Many suggestions have been made to the effect that those dyes which are most prone to aggregation and coagulation on addition of electrolytes, are most substantive towards cellulose. Within narrow limits this may be true, but even if it were more general it might merely indicate that aggregation and substantivity were effects correlated because they were determined by similar underlying factors. It might be, for example, that dyestuff molecules, which are most prone to stick to one another, are also most prone to absorption by cellulose. The advocates of the aggregation theory suggest that a certain optimum particle size is necessary for good dyeing, and that above a certain limit penetration into the cellulose cannot take place.

The writer's researches lend little support to such a view. It is certainly true that in the absence of added salt—when, according to the aggregation theory, the particle size is a minimum—very little absorption of dye takes place. As salt is added, however, the absorption increases continuously, right up to the point where gross visibility coagulation of the color occurs. Moreover, in the absence of salt, the rate of diffusion of dye *through* a cellulose membrane is vanishingly small, but as salt is added it increases more and more, until a steady maximum value is attained.

A more profitable subject from the point of view of the dyestuff user, is the relation between the condition of the cellulose and its affinity for dyestuff. Dye-house practice, basing its conclusions on visual judgment, has arrived at the following generalizations in this respect.

(1) Cotton of coarser growth dyes to a darker shade with the same dyebath than the finer varieties such as Egyptian and Sea Island. The greater the hair weight per centimeter, the darker the shade.

(2) Mercerization increases the affinity of cotton for dyestuffs. Increase in the degree of swelling raises the affinity; increase in the tension or in the temperature of dyeing decreases it. Care must be taken to preserve uniform conditions of mercerization, or uneven dyeing may result, becoming particularly evident in knitted garments.

(3) Chemical degradation of cotton resulting from the action of mineral acids, or from overbleaching in the acid

*Reprinted from Textile Recorder.
†American Dyestuff Reporter, 1933, 344, 651 and American Dyestuff Reporter, 1934, 109.

bleach liquors, reduces the dyeing affinity, but not to a very marked extent. Overbleaching with alkaline liquors, on the other hand, or oxidation caused by oxygen in the kier, or by the prolonged exposure to air of goods saturated with alkali, causes a very marked reduction in the dyeing affinity, which often causes trouble in the chemical practice. These alkaline oxidations result in the formation of an "oxycellulose" with acidic properties, evidenced, for example, by an enhanced affinity for basic colors such as Methylene Blue. It is this particular type of cellulose modification that appears to be associated with the reduction of affinity for direct colors.

(4) Viscose rayon dyes a heavier shade than cotton when the weight of dyestuff exceeds one quarter of a lb. per 100 lb. of goods, but in lighter shades the cotton is usually the darker.

(5) Viscose rayon often shows great irregularities in dyeing. These are due, however, to differences in dyeing speed rather than in ultimate affinity, and may be minimized either by raising the temperature of the dyebath, by prolonging the period of dyeing or by the choice of colors which dye rapidly to an equilibrium.

(6) Cuprammonium rayon always dyes a heavier shade than cotton or viscose rayon. The contrast with viscose is particularly marked in light shades. Dyes penetrate into cuprammonium rayon much more readily than into viscose and there is not the same risk of uneven dyeing with this material. Lower temperatures and a wider range of colors may therefore be used with safety.

Recent research work has thrown some light on the nature of these differences in the dyeing behavior of different kinds of cellulose. In the case of the coarser and finer varieties of cotton the difference is more apparent than real. It lies not so much in differences of affinity for the color, as in the fact that the finer hairs reflect relatively more light and so *appear* to be lighter in shade. A familiar analogy may be drawn with a transparent colored solid such as crystalline copper sulfate, which, when powdered, appears to be of a much paler hue. With the smaller crystals multiple reflections of the light take place before they have penetrated far into the mass. The change in hue of the light is dependent on the distance of penetration, and the eye is concerned only with the hue of the rays reflected from the material.

The effect of the mercerization of cotton upon its affinity for dyestuffs has been found to be closely parallel to its effect upon absorption of moisture, dilute alkalies and other re-agents. Mercerization without tension followed by dyeing at air temperature causes an increase of about 1.5 fold in the absorption of dyestuff, but the application of tension as in the industrial process restricts the increase of affinity to about 1.4 fold. Drying at about 100° C., after mercerization, causes a further fall in affinity to about 1.2 times that of unmercerized cotton. These increases of affinity are more or less independent of the dyestuff used, and of the particular conditions of dyeing. This is in line with the generalization that the reactivity

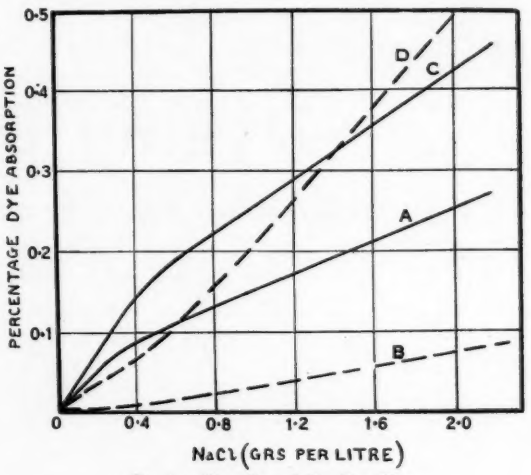


Fig. 1. Absorption of Sky Blue FF.

of cellulose is increased in all directions as a result of a swelling treatment such as mercerization. In considering the probable importance of fluctuations in the process, it must be recognized that the visual examination of a fabric dyed in a light or medium shade is rather a critical test. Under these conditions the eye can detect sudden fluctuation in dye content of as little as 2 or 3% of the normal.

The oxidation of cellulose in alkaline solution has been found to depress the affinity for dyestuff to a surprising extent. In Fig. 1 the curves of dyestuff absorption against salt concentration are shown for bleached cotton cloth at A, the same after oxidation with N/100 hypobromite N/10 NaOH (oxygen taken up 0.3% of weight of cellulose) at B, cotton mercerized loose and air dried at C, and commercial viscose at D.

The degree of oxidation represented by B, which is accompanied by a loss of about 80% of the tensile strength, is certainly greater than any likely to be encountered in bleaching practice, but is of the same order as that found in viscose rayon. This oxidation reduces the absorption, in light dyeings, to less than one-quarter of its normal value. The mercerized cotton takes up uniformly about twice as much dye as the standard cotton.

In the curve for viscose (D) the combined effect of these two factors can be seen. The wood pulp cellulose used for viscose rayon is, during the course of manufacture, oxidized to a very considerable extent. This takes place chiefly during the "ageing" process, where the alkali saturated cellulose is exposed to air until the viscosity has been sufficiently reduced. This oxidation of the cellulose is necessary to provide a solution of workable viscosity, but is in other respects detrimental to the quality of the product. The oxidation is of the type which results in decreased affinity for direct dyestuffs, and this is shown by the shape of the absorption curve, which shows a specially depressed absorption at low concentrations of salt.

Compared with cotton cellulose, viscose rayon would, on account of the effect of swelling, be expected to show much greater absorption of dyestuff, since the dissolving

(Continued on page 665)

The Fading of Dyed Textiles*

Factors Which Influence It; Instruments for Testing Fastness

By A. C. GOODINGS, M. Sc., Ph. D.†

COLOR fastness of dyed textile materials has always been recognized as a matter of importance, but much more attention has been paid to it in recent years as a subject for systematic study. This is without doubt a natural result of the growth of the synthetic dye industry. In earlier times all the dyes used were of natural origin and limited in number, and the fastness properties of these different coloring matters were fairly well known from experience. To-day, however, the picture is totally different. With the growth of the synthetic dye industry in the last 80 years, hundreds of new dyestuffs are now available to us, completely revolutionizing this phase of dyeing.

Light Fastness

Of the various fastness properties of interest in relation to textile materials, fastness to light is one of the most important and it is the purpose of the present paper to discuss some of the factors which influence fading.

It is perhaps as well to state at the outset that precise and detailed knowledge of the cause of fading and the way in which it progresses is, as yet, in a very elementary state. Many observations have been made on the phenomenon and valuable information gathered, but our observations remain to a large extent isolated findings, and have so far defied scientific generalizations. For example, we may be given a certain dyestuff and told its chemical constitution, but we could from that say little, if anything, about its fastness-to-light qualities. Perhaps the number of factors which influence fading will never permit of any very comprehensive practical generalizations, and, indeed, the more that is learned of fading, the more complicated the picture would appear to become.

From a practical point of view it might be said, "Let us test the fastness of all dyestuffs by exposing dyed materials to sunlight and then we shall have a compilation of material we can use." But it is not so simple as all this, because, as stated, there are many factors which influence fading and which upset any such easy scheme. A consideration of some of the different factors and the way in which they affect fading will make this clear.

The factor influencing fading which perhaps comes most readily to mind, at any rate with regard to its effect on rate of fading, is the strength of the sunlight falling on the dyed material. It is to be expected that the stronger the light, the greater the loss of color will be, and in general this is true, but recent investigational work has shown that the amount of fading which takes place is not necessarily proportional to the intensity of the light. In other words, light which is twice as strong does not necessarily mean that a given dyed material when subjected to it will fade twice as quickly. Some dyed materials will and some will not. With regard to sunlight it may be as well to point out here how variable this is in the matter of intensity. One has all the variation between country and country, between summer and winter, between rain and shine, between clear and cloudy skies.

The Nature of Light

The nature or kind of light falling on dyed material is of very great importance as regards fading. Sunlight is built up of light of various wave-lengths which in the visible region, range from violet, at one extreme, through blue, green, yellow and orange, to red at the other extreme. Beyond the violet we get into the region of the so-called ultra-violet light which in recent years has become very familiar to everyone by virtue of its beneficial effects under the name of "sun-ray." Now the nature of the light, meaning its composition, has a very significant effect on the way a material fades and also on the rate at which it fades. For example, ultra-violet light is very much more active in promoting loss of color than is the normal visible region of the spectrum. It is further believed highly probable that different colors are affected more by certain components of sunlight than by others; for example, a yellow dyeing may be more affected by the yellow component of white light than by any other band of the visible spectrum and more than, say, a red dyeing would be. On the other hand, the reverse may be true and this point still requires further elucidation.

Testing

The factors already mentioned bring up very important points with regard to the testing of dyed materials for their fastness towards sunlight. While the requirement of the trade is to produce dyed material which will not fade on exposure to sunlight, the sun itself, because of its variability, is not of much use to us in actually making tests. In winter, in Canada, its efficiency would be decidedly low and in any case it certainly cannot be made to work 24 hours a day. What is required is a constant

† Director, Textile Department, Ontario Research Foundation.

* Address to the Canadian Association of Textile Colorists and Chemists, and printed in Canadian Textile Journal.

source of illumination which acts on dyed material in the same way as sunlight.

To meet this need we have had developed in recent years various instruments for testing fastness by means of an artificial source of sunlight. From what has been said it is readily seen that if we are to get results which are comparable to sunlight our source of illumination must give light of the same nature or character as actual sunlight. This is by no means simple to obtain and probably one of the most serious defects of present-day light fastness testing instruments is the deviation of the light produced by them from true sunlight. The closest approach in commercial instruments has been realized by the use of the violet carbon-arc. Actually it is a fairly good approximation to sunlight but somewhat strong in certain parts of the spectrum and deficient in others. The light of an unscreened mercury-vapor arc is quite different from the light of the sun, being particularly rich in ultraviolet light. This causes completely different fading from that produced by sunlight and is quite misleading in results obtained with it.

The fact that the intensity of the light affects the rate of fading, and that a change in intensity does not affect the rate of fading of all dyestuffs to the same extent, would appear to demand that the intensity of our source of illumination in a testing instrument should be of the same order as sunlight. This is true of instruments employing the violet carbon-arc, and an attempt to get instruments which would speed up testing considerably might quite easily lead to wrong results.

Humidity

Consider now some further factors which influence fading. Next to the nature of the light itself, humidity is perhaps one of the most important. The relative humidity of the air surrounding the dyed material while exposed to light may have a very great effect on the rate at which material fades, and the susceptibility of fading towards this humidity factor varies enormously with different individual dyestuffs. The main effect may be a result of the influence of relative humidity on the moisture content of the fabric, and this effect might be stated as the influence of regain on rate of fading. This point, however, is one not properly settled and it is perhaps better to think, for practical purposes, in terms of atmospheric humidity.

In the case of one dyed material tested by a research worker in England, it was found that the amount of fading which took place at 90 per cent relative humidity was as great as that produced by three times the length of exposure at 30 per cent relative humidity. In testing the relation between moisture content and rate of fading, another worker found that the loss of color on mercerized cotton dyed with a brilliant green and exposed with a regain of 27 per cent was seven times as great as the loss with the same material exposed at 5 per cent regain for the same length of time.

Another factor affecting the rate of fading is temperature, but its effect is not, in general, nearly as great as that produced by humidity changes. Temperature, of course, has an effect on moisture content and to some extent at least one would expect it to have a bearing on fading due to this cause, but apart from this it appears to have an influence of its own. To quote another experimental result, made by Hedges in England, it was found in an experiment with Solway Blue that there was 75 per cent more fading at 50 deg. C. than at 10 deg. C., the moisture content of the material under test being the same in both cases. It should be pointed out, in connection with the temperature, that when a material is exposed to sunlight there are two features to consider: the temperature of the air and the temperature at the face of the material. Due to light falling on the surface of the material it becomes heated above the temperature of the air surrounding it. The extent of this temperature rise depends upon the nature of the material but an average found by experiment during the summer months in Toronto for a white flat cloth and a dark plush was 25 deg. C. or 45 deg. F.

Reproducing Atmospheric Conditions

As regards testing instruments, it is obvious, if we are going to reproduce sunlight fading, that these factors of temperature and humidity must be controlled. A difficulty arises due to the fact that atmospheric conditions are constantly changing and it is difficult to know what conditions of temperature and humidity should be reproduced. Average figures for the summer months during the daytime, when fading is greatest, calculated from meteorological data for Toronto for a number of years gave results of 53 per cent relative humidity and 70 deg. F. temperature, and perhaps the striking of an average in this way is the best that can be done.

The nature of the fiber itself plays an important part with regard to fastness. It is fairly well known that the same dyestuff dyed on the different fibers—wool, cotton, silk, etc.—has not, in general, the same degree of fastness. For example, indigo dyed on wool is faster than when dyed on cotton and methylene blue on cotton is faster than on wool. This, of course, immediately complicates the picture as far as saying a dyestuff has any particular degree of fastness—it depends upon the material on which it is dyed, and also upon the dyeing method.

Another factor relating to the fastness is the concentration or amount of dyestuff on the material. It is quite a common belief that heavy shades are faster than lighter shades of the same dyestuff. This introduces the point of how the rate of fading of a dyed material progresses. Is there an absolute amount of color destroyed in a certain exposure irrespective of how deep a shade the material has been dyed? That is to say, if we had 2 and 4 per cent dyeings, and these were exposed to sunlight until one had lost, say, 1 per cent of dyestuff, would the other have lost 1 per cent also, leaving what would be the equivlent of 1 and 3 per cent? If this were so, deeper shades would appear to fade less rapidly but this does not seem

to be the truth of the matter. It is possible that equal proportions of the total dyestuff on the fiber might be lost in equal times, say, 50 per cent, and our faded 2 and 4 per cent dyeings would then be equivalent to 1 per cent and 2 per cent respectively. This does not appear to be the truth either, and examination of the rate of fading in the case of several dyeings did not show any simple law governing rate of loss. Indeed, in the case of some dyed materials, exposure to sunlight causes very little appreciable change for some time and then the dyestuff appears to break down rapidly. In other cases very rapid fading occurs in the early stages and then appears to slow up and further change goes on very slowly.

Crease-Resisting—

(Continued from page 648)

conjunction with certain quantities of water soluble organic solvents such as mono-hydric alcohols, water soluble esters, glycols or mono-ethers or mono-esters of the same, glycerol, formamide, or suitable softening agents such as glycerol triacetic ester, and if desired with admixture of wetting agents such as soaps, sulfonated oils, etc.

If this process were used the resultant product would certainly be crease-resisting. The possibility of infringement on one of the earlier mentioned patents is beyond the scope of this paper.

With all the activity on the part of inventors that has been considered above, and with the convertor showing increased interest in crease-resisting finishes, the popularity of this type of finish appears to be well established and likely to continue so for some time.

Washington—

(Continued from page 650)

tions in the legislative pathway grows out of the circumstances that the entire proposition of business-regulation-by-Governmentally-sponsored - gentlemen's - agreement is bound up with the interdependent question of relaxation (by statute or otherwise) of the portions of the anti-trust laws which frown upon all concert of action in industry as combination or conspiracy.

Progress toward the new concept of the Trade Practice Conference has been made, wholly on the executive side, since the lapse of NRA. Perhaps the longest step forward is to be found in the disposition in industry to line up for joint action the several trade associations in a broad field of sympathetic interests rather than to leave each unit and subdivision to be negotiated as a separate entity. This detail of policy awaits the initiative of organizations in industry, since the tradition endorses that the Federal Trade Commission is merely the intermediary for the representatives of an industry who act voluntarily and on their own initiative in establishing self-government in business and mustering the support for the industry's own rules of business conduct, formulated with the advice and approval of the Trade Commission.

The apprenticeship of the Trade Practice Conference has stood the institution in good stead now that it is suddenly called upon to extend its scope. The Conference pattern has come far since it rose from the ashes of its predecessor, the Trade Practice Submittal which failed to distinguish between practices of competition in violation of law and the trade practices and trade abuses which, though open to criticism, were not illegal in themselves. The factors of wages, hours of labor, etc., have come to the front in the dynasty to obscure some of the more intimate phases of business treaty-making via Practice Conference. The special elements are yet to be reckoned with, however, in any line involving standards of composition, processing, etc. To sense the potentialities of the Trade Practice Conference in the immediate environment readers of the REPORTER need but reread the provisions regarding "pure dye goods," etc., which were adopted several years since at the Conference held at the Hotel New Yorker on the subject of silk weighting.

Dyeing—

(Continued from page 662)

of the cellulose has opened up the structure so as to cause generally enhanced reactivity. The dyestuff absorption curve for viscose is therefore compounded of these two effects. At low concentrations of salt the oxidation effect predominates so that viscose absorbs less dye than normally bleached cotton, but at high concentrations of salt the swelling effect predominates and viscose shows the higher absorption. The viscose curve has the same shape as the curve for the oxidized cotton, but on account of its more open structure the actual absorption values are all much higher.

To sum up—oxidation alters the shape of the dye absorption curve, depressing the absorption relatively more at low than at high concentrations of salt. Swelling or solution and regeneration on the other hand, do not affect the shape of the absorption curve, but give rise to products which absorb more dyestuff in a fairly constant proportion over the whole range of salt concentration.

• U. S. OIL APPOINTMENT

P. H. Doremus & Co., 222 West Broadway, Paterson, N. J., was recently appointed as New Jersey district sales headquarters for the U. S. Oil Co. of Providence. Mr. Doremus is well known in the chemical supply business and his affiliation with U. S. Oil should be of benefit to all. The chemical division of U. S. Oil is conducted by Brackett Fernald who is also well known in the textile, chemical and dyestuff industry.

Degumming

of Real Silk Materials*

By A. J. HALL, B. Sc., F.I.C., F.T.I.

AS is now well known, in the spinning of a silken cocoon the silkworm extrudes simultaneously two threads of fibroin and these are at the same time cemented together to form a double thread with a glutinous substance termed sericin. The raw silk thus consists of the real silk threads of fibroin and the silk gum sericin, and at a suitable stage in manufacture it is desirable to remove the gum and so leave the fibroin threads in a more lustrous and supple state. This degumming process is an important one since it must be carried out without adversely affecting the silk, particularly as regards tensile strength and softness of handle.

Since raw silk is stronger than degummed silk, it is generally better to leave the degumming process until a late stage in the manufacture of the silk goods, that is, after weaving or knitting.

TWO TYPES OF PROTEIN

Sericin is not a single substance for it has been separated into at least two different types of protein. It can be removed from raw silk by digestion with water at a pressure of about 10 lb. per square inch, and then precipitated from the resulting aqueous solution by addition of alcohol followed by drying. But, if increasing amounts of ammonium sulfate are added to the aqueous extract then sericin A and sericin B are precipitated in turn. Alternatively, the aqueous extract may be brought to pH = 4.1 by addition of sulfuric or acetic acid, when sericin B separates and can be filtered off; addition of alcohol to the filtrate then precipitates sericin A.

The proportions of sericins A and B in silk gum varies with the type of silk, but usually there is about three times as much sericin B as sericin A. The total amount of sericin in raw silk varies from 20 to 30 per cent, and this represents the loss of weight which occurs in degumming.

Both types of sericin differ from the fibroin thread in being soluble in mild alkalies such as dilute solutions of sodium carbonate, caustic soda, and sodium silicate. But experience over many years has shown that a boiling soap liquor is the safest and most convenient degumming agent.

It must be remembered that removal of the sericin is not the only consideration. It is important that this removal should leave the silk soft and elastic. If caustic soda is used for removing sericin then the silk is left in poor condition, but if a soap solution is used then the silk is left with all its desirable properties unimpaired. To understand this difference in behavior it is necessary to consider more closely the degumming process itself.

During degumming it can be clearly observed that the alkalinity of the solution of soap, soda ash, or sodium silicate steadily decreases. By the use of suitable color indicators it can be shown that when the initial pH of the liquor is say, 10.3, then this is reduced to about 8.6 at the end of the degumming process. This result is due to chemical combination between the sericin and the alkali. For this reason decomposition of the alkaline degumming agent must occur, and the nature of the products formed must determine to some extent the resulting character of the silk.

When soap is used as a degumming agent then chemical union of part of its alkali content leads to liberation of an equivalent proportion of free fatty acid. This latter will be emulsified by the remaining unchanged soap and the resulting fatty acid-soap complex will have less adverse effect on the silk than will an alkaline soap solution alone. It is believed that the free fatty acid acts as a protective colloid towards the silk in much the same manner as does a substance like boric acid in the dyeing of acetate rayon with alkaline vat dye liquors. Thus, raw silk degummed with soap will have a better handle than when caustic soda alone is used. For, when caustic soda is used, only water is liberated as a result of the chemical union between alkali and sericin, and water, of course, does not act as a protective agent. The handle of silk is not so much harmed by sodium silicate as caustic soda, but even in this case it is desirable to have present soap or soluble oil.

Now, whatever degumming agent is used, it is interesting to note how the rate of degumming is influenced. How is degumming influenced by the temperature of the liquor, the degree of alkalinity, and the movement of the degumming liquor? In bleaching and dyeing works it is seldom possible to investigate thoroughly the various factors which influence degumming, but, fortunately, H. W. Wolf and O. A. Hougen (*Text. Research*, 1934, *5*, 92, and 1935, *5*, 134 and 191) have had such an opportunity, and the results obtained are exceptionally useful.

THEORY AND PRACTICE

Firstly, on the theoretical side, it may be stated that the sericin which constitutes the silk gum does not, during degumming, combine with a constant amount of alkali. It is found that the amount of alkali fixed by the sericin

*Textile Mercury and Argus.

decreases progressively with an increase in the initial ratio of alkali to sericin present, and that this relationship holds good for processes in which caustic soda, sodium carbonate, soap and sodium silicate are used as degumming agents. Under normal conditions of degumming, and in the initial stages, one gram of caustic soda appears to combine with 400 grams of sericin, but towards the end of the degumming process only about 10 grams of sericin combine with one gram of the alkali. The amount of sericin which can thus combine with alkali decreases with a decrease of pH of the degumming liquor.

Turning now to practical conditions, it is found that temperature is important. At 130° F., the rate of degumming is negligible, but at 200° F. it is three times more rapid than at 180° F. The temperature of degumming should, therefore, be as high as is possible with the particular degumming agent used without adversely affecting the handle of the silk.

Agitation of the degumming liquor effects a marked increase in the rate of removal of the sericin. Degumming takes place about 3½ times more quickly in a moving liquor than when the goods are stationary. Thus, a boiling soap liquor is very effective because a vigorous motion of the liquor is ensured by the escaping steam.

In general, the rate of degumming increases with an increase of pH of the liquor but this relationship is liable to vary considerably according to the degumming agent employed. Thus pH measurements can assist in controlling degumming, but pH values alone cannot be taken as a measure of the rate of degumming. This fact can be illustrated by reference to the action of different degumming agents.

With alkalis such as caustic soda, borax, sodium carbonate, sodium silicate, and trisodium phosphate used as degumming agents it appears that the rate of degumming is not much influenced by their concentration in the degumming liquor nor by the pH of the liquor. On the other hand, soap behaves quite differently in that the concentration and pH of the degumming liquor containing it, largely determines the rate of degumming. The effectiveness of the various alkalis is rated as follows:

Alkali	*Degumming coefficient*
Sodium hydroxide	984
Sodium carbonate	827
Sodium silicate	427
Trisodium phosphate	349
Borax	189
Sodium bicarbonate	173

The degumming coefficients are specific for each agent.

EFFECT ON QUALITY

When a mixture of a mild alkali is used together with a sulfonated oil for degumming, it is the alkali alone which is effective in removing the sericin. The sulfonated oil has the effect of preserving the soft handle of the silk, producing a level dyeing silk, and preventing yellow discoloration of the silk such as occurs when an alkali alone is used. The sulfonated oil neither retards nor accelerates degumming. The rate of degumming decreases when the soap solution has a normality lower or higher than 0.053 N.

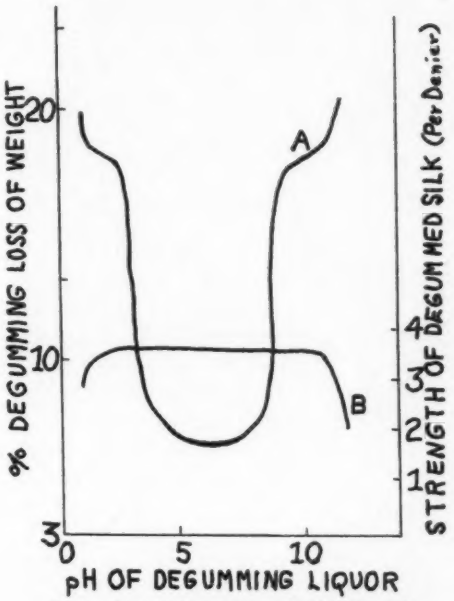


Fig. 1.—Curve A shows amount of sericin removed. Curve B shows strength of degummed silk yarn.

The manner in which the pH of the degumming liquor influences both the amount of silk gum removed and the tensile strength of the residual silk threads can be seen by reference to the curves in Fig. 1 which has been prepared by H. H. Mosher (Melliand's *Text. Monthly,* 1935, 16, 143). The results represented by the curves were obtained by degumming at 212° F. for half an hour using raw Japanese silk yarn.

Curve A shows that maximum degumming occurs either in a strongly acid bath (pH = 1 to 3) or an alkaline bath (pH = 9.0 to 11.5). Minimum degumming occurs around the neutral point (pH = 6 to 7). But if these results are taken in conjunction with the strength curve B, then it becomes evident that degumming is most satisfactorily carried out with a liquor of pH = 9.5 to 10.5.

● NATIONAL RELEASE

National Aniline & Chemical Co. announces release of a circular on *National Niagara Navy Blue B W,* an addition to its line of direct colors. It is said to be well suited for the production of navy blues of fair fastness on cotton, rayon and pure silk. In the dyeing of fabrics containing mixed fibers, silk is dyed the same shade and strength as cotton, wool appreciably greener and duller than cotton, and rayon considerably stronger than cotton. It is especially recommended by the manufacturers for the production of white acetate silk effects in mixed goods containing this fiber. It is stated that it will discharge readily with hydrosulfite and is a useful ground color for discharge work on rayon and pure silk.

Open Forum

(*See previous issue for details of this department*)

32—I am experiencing some difficulty with knitting yarns in that they are harsh after dyeing to such an extent that they do not possess the necessary spring or elasticity to permit them to knit the same width as the natural grey yarn. In other words, material knitted from the dyed yarn under apparently the same conditions, comes from the machine wider than that knit from grey yarn. It is further a fact that I find that dyed and bleached yarn spreads out in the knitting machine as compared with that which is unbleached and which has not been specially treated in any way.

How can this be overcome, should it best be done through the use of softeners, or, through modification of the bleaching and dyeing process?

Any suggestions will be appreciated.—**W. P. B.**

● MOTION PICTURES

The complete story of the production and use of the important industrial metal, nickel, is pictured interestingly in a new 2-reel silent educational motion picture film recently prepared under the supervision of the United States Bureau of Mines, Department of the Interior, in cooperation with an industrial concern.

The story opens more than half a mile below the earth's surface, where nickel ore is mined and then traces it through all manufacturing operations.

The latter part of the film portrays the increased importance of nickel alloys, chiefly those with iron, steel and copper. The film ends with several scenes showing how nickel is utilized in industry, in sports, and in the home.

Copies of this film in 16-mm. or 35-mm. sizes are loaned for exhibition purposes, to schools, churches, clubs, civic and business organizations, and others, upon application to the Pittsburgh Experiment Station of the United States Bureau of Mines, Pittsburgh, Pa. No charge is made for the use of the film, but the exhibitor is asked to pay transportation charges.

● GENERAL RELEASES

General Dyestuff Corp. announces release of circulars on the following products.

Celliton Discharge Red BBL—said to produce a bluish red shade of very good fastness to light which is easily dischargeable to a pure white with *Decroline Soluble Conc.* It is recommended by the manufacturers for application printing.

Alizarine Direct Blue 6 *G*—a new acid dyeing alizarine dyestuff brought out by the I. G. and offered to the trade by General. It is said to level well from a Glauber's salt-sulfuric acid bath and to produce bright greenish blues of very good fastness to light. In combination with *Fast Light Yellow* 3 *G New*, green shades of very good fastness to light are said to be obtained, which so far could not be produced in this brilliancy. It is recommended by the manufacturers for the dyeing of ladies' dress goods and woolen yarn. It is also said to have good affinity for silk.

● DIGLYCOL LAURATE

A new non-hygroscopic, water dispersible oil (Diglycol Laurate) is now being produced commercially by the Glyco Products Co. Inc. Diglycol Laurate is said to be practically odorless, light straw colored, non-viscous and completely soluble in all proportions in alcohol, mineral and vegetable oils, and hydrocarbons. It is further said to be self-emulsifiable in water and to act as an excellent emulsifying agent for other oils and solvents. It is stated that because it is soluble in alcohol, it replaces castor oil where an alcohol soluble oil is required, being practically odorless and free from "tack" and easily removed by cold water. Diglycol Laurate is recommended by the producers for the manufacture of emulsions in the paper, textile, leather, cosmetic, polish and other industries. It is claimed that it is non-toxic and edible, and having a low surface tension, is suggested for use where rapid penetration is required. It is further stated that it is high boiling and will not evaporate or thicken with age.

● PERMUTIT ELECTION

Henry W. Foulds has been elected vice-president of the Permutit Co. and will correlate and direct all sales, promotion and advertising of this company. Mr. Foulds, a graduate chemical engineer has had twenty years' selling experience with a diversified background. Assisting him will be L. S. Ferguson, manager of industrial sales; O. P. Harris, manager of domestic sales and H. H. Wilkinson, advertising manager.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

WANTED—Experienced ribbon dyer on silk rayon and cotton mixtures. References wanted. Plant in New Jersey district. Write Box No. 871, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.